Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

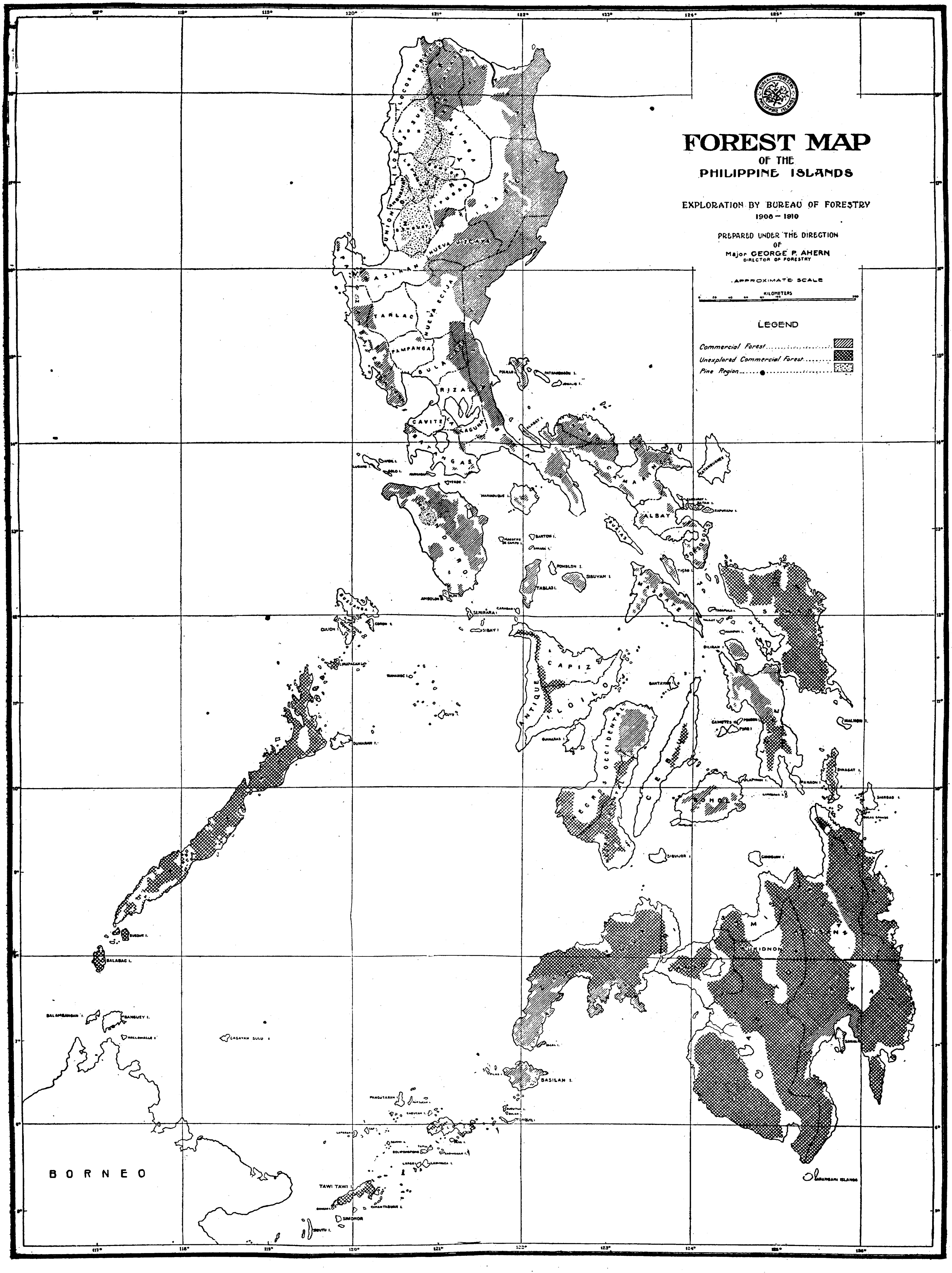

FIG. 1—Reduced from the map in Vol. I of Whitford's "Forests of the Philippines."

BULLETIN
OF THE
AMERICAN GEOGRAPHICAL SOCIETY

Vol. XLIV **1912** **No. 2**

THE FORESTS OF THE PHILIPPINES

BY

PROFESSOR J. PAUL GOODE
University of Chicago

The frontiers of science have been extended in many ways by earnest workers in the Philippines, since America took charge of the government there. When one reflects that peace has been established only a dozen years, that the various lines of scientific work have been developed with only moderate appropriations, and that, in many lines, men have had to be trained to the special problems on the ground, it is marvelous what progress has been made.

The study of the forests in the islands, as a commercial asset, has been undertaken by the Forestry Bureau. The director of the Bureau, Major George P. Ahern, has not only made a rapid and effective survey of the commercial forest resource, but he has also had the wisdom to associate with himself young men of the highest scientific training and ability, and has thus made the study of the forest resource yield at the same time scientific studies of high value. The latest bulletin* is an example of this double purpose adequately served. Dr. Whitford has spent years cruising the forests, making careful estimates of the quantity, quality and availability of the merchantable timber. But at the same time he has gone with the point of view, and the note book of the trained botanist and ecologist, and his report is a splendid example of a scientific contribution, put in non-technical language, equally available for the business man interested in the lumber industry, and for the geographer and botanist wherever he may be.

---

* Whitford, H. N. The Forests of the Philippines. Part I, Forest Types and Products, pp. 94. Plates 28, map. Part II, The Principal Forest Trees, pp. 113. Plates 103. *Bull.* 10 of the Philippine Bureau of Forestry, Manila, 1911. $1.25, post free.

The statement here made of the forest resource of the Islands is somewhat startling, and very instructive. Dr. Whitford publishes a map of the archipelago (Fig. 1), showing that of the total area of something over 120,000 square miles, one third, or 40,000 square miles, is in the natural untouched forest primeval, an area about the size of Kentucky; 20,000 square miles more are in second growth; 48,000 square miles are in grass land; and only 12,000 square miles are under cultivation. Of this latter figure, small as it is, a footnote calls attention to the fact that not over 6,000 square miles is under cultivation at any one time. The cultivated areas are mostly small

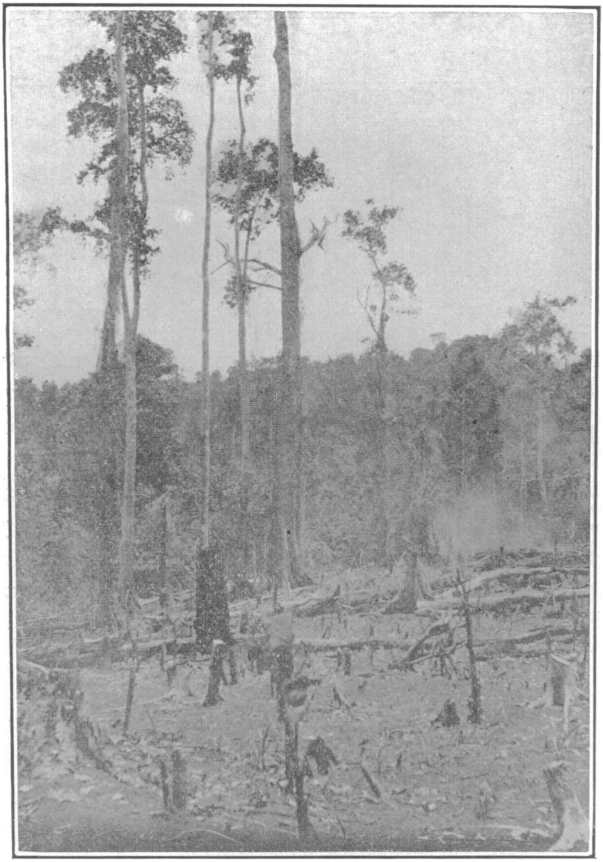

FIG. 2—A caingin area in Mindoro.

and widely scattered. It is a good deal of a surprise to know that the entire population of about 8,000,000 is supported by the cultivation of only about 5 per cent of the total area.

It is reasonably certain that the entire surface of the land was originally covered with forest growth of some kind. But caingin making, a primitive method of agriculture, has destroyed over half of the original cover. This method of agriculture, common in the tropics, is as follows: A patch of forest is partly cut and the felled stuff allowed to dry, and then burned.* Into this partly cleared area crops of rice, sweet potatoes, corn and the like are planted. By the time one or two crops have been taken from the patch, the cogon grass has come in. Its roots make such a network, and it grows so fast and so rank, that it is extremely difficult, with primitive implements, to win a crop in competition with it. So the patch is abandoned, and the easier task of destroying another area of forest is begun again. The cogon grass, in the dry season, burns very easily, and the constant burning keeps down every ambitious forest seedling, though it does not injure the grass. The grass is so coarse as to be nearly worthless as forage, and, as a consequence, very large areas, nearly half the land surface, lie idle and mostly worthless. If the *cogonales* could be kept free from fire, the forest would come back, ultimately to the original form, with a forest covering determined by the factors of climate, soil and exposure.

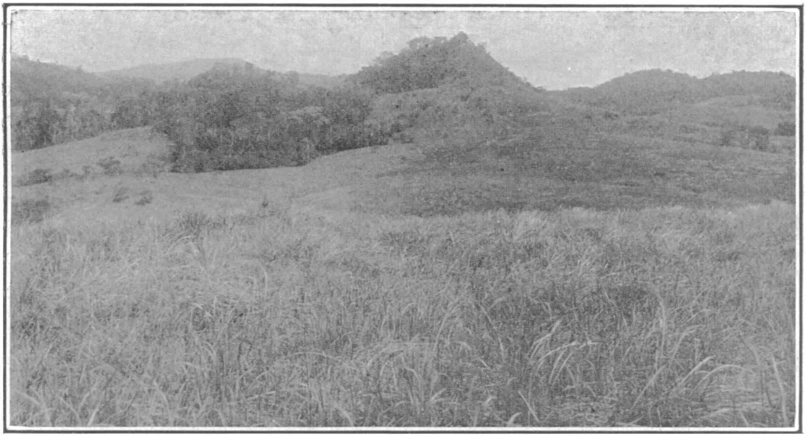

FIG. 3—Cogon grassland, from which the forest has been removed by "caingin making."

The prevention of further destruction of the virgin forest, and the reforestation of the grassy regions on non-agricultural lands, both by the prevention of fires, and by planting, are the greatest forestry problems of the Philippine Islands.

---

* All the illustrations for this article are from photographs by the Philippine Forestry Bureau.

The variations in climate, soil, and exposure determine various types of forest. Ten such types are here described, the first five of which have one family of trees, the dipterocarps, predominating.

1. The *Lauan type* is the most successful commercial forest in the Island. It is confined to regions of short or no dry season, and is best developed on gentle slopes at mountain bases, up to an altitude of 1,200 feet. It is comparatively free from jungle undergrowth and has a very complex small-tree flora, with many climbing palms. This forest has a rather closed canopy and regular profile. The forest floor, because of the shade, has a very scanty growth of herbaceous vegetation. "Stripped of its ornaments of palms, leaves, epiphytic orchids, and ferns, whose importance is exaggerated in the eyes of the people of the temperate regions, the lauan type of forest has a striking resemblance to the commercial forest of the temperate zone."

2. The *Lauan-hagachak type* occurs in regions with rainfall well distributed throughout the year, and even here is restricted to areas where the water level is near the surface of the ground. It is at its best on river bottoms. There is a larger variety of trees in this type of forest than in the lauan type.

3. The *Yacal-lauan type* is best developed where the dry season is short, and on volcanic soils. Hence the areas are not large.

4. The *Lauan-apitong type* is found in regions of longer dry season than the lauan type; hence shows a decided deciduous element in the dry season. On the lighter soils it is quite open, allowing the entrance of jungle undergrowth, especially the erect bamboo. The composition of dominant species is more complex than is the case in the lauan type, and with the rather scattered trees and the bamboo undergrowth, the forest has the appearance of a park.

5. The *Tanguile-oak type* lies above the lauan forest standing from about 1,200 feet to 2,500 feet above the sea level. Here the rain is more evenly distributed through the year, and the relative humidity is higher than is the case in the previous types. This is a meeting ground for many species from above as well as from below. This forest grades into the mossy forest above.

6. The *Molave type* occurs usually on dry limestone soil. This type covers an area of about 4,000 square miles. The trees are the

most valuable in the archipelago, and since the areas are most easily reached, this type of forest has suffered most by exploitation. The forest is open, with large trees few and far apart, and with spaces filled by jungle growth. It is decidedly deciduous in the dry season. Its composition is quite variable in different regions, depending upon differences of soil and exposure. It is very valuable because of its narra, acle, and other hard and durable timbers of high value as furniture and cabinet woods.

7. The *Mangrove type* is a forest of the sea; especially well developed in mud flats at mouths of rivers. A zone of nipa palm lies usually at the upper margin of the forest area. The canopy is well closed and even, and undergrowth is absent. It is estimated that the swamps of the islands will show an average volume of 283 cubic feet per acre of trees over eight inches in diameter. This forest is a very valuable source of firewood, charcoal and cutch.

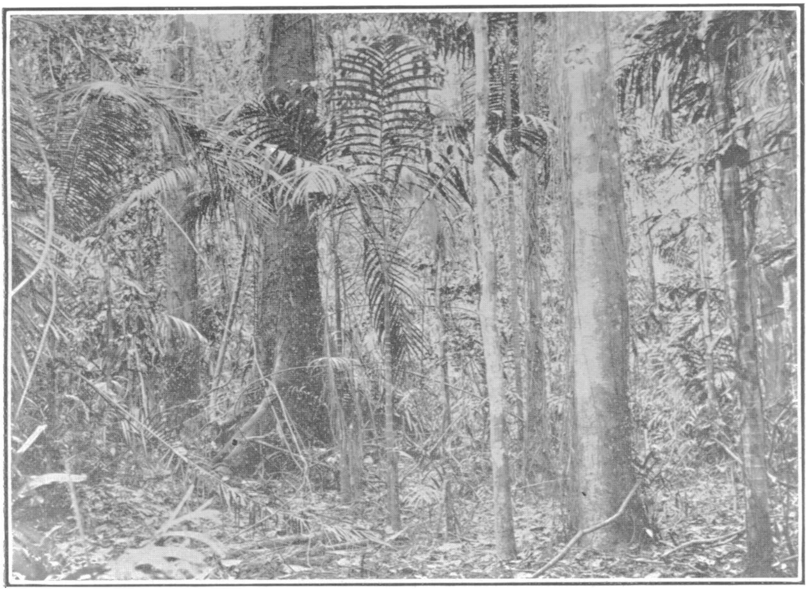

FIG. 4—Typical lauan forest in Mindoro.

8. The *Beach type* is found on sandy beaches above high-tide. It has been much interrupted by cultivation. In the Davao region it is rich in timber, running to 100,000 board feet per acre.

9. The *Pine type* is best developed in the high plateau of northern Luzon, from altitudes of 2,500 to 5,000 feet. The trees are scat-

tered as single individuals in a grass area. There is ample evidence that broad leaved trees once occupying the area have been exterminated by man. The pine, less sensitive to fires, has won its way back, and is holding its own in a region that would normally be occupied by broad leaved species. There are only two or three species of pine found in the Islands.

10. The *Mossy-forest type* occupies about 3,200 square miles or about three per cent of the land surface. It consists essentially of protective forests. The topography is rough and constantly changing. The soil is scarce and land slides are common. The climate is exceedingly moist, hence there is a great development of mosses and and liverworts. Because the slopes are much exposed to the wind, the trees are of dwarf and gnarly habit.

The northern half of the archipelago, consisting of Luzon, Mindoro and the northern part of the Vizayas, has been explored, charted, and commercial estimates put on record (Fig. 1). Much of the forest area of the southern half of the archipelago is still unexplored and relatively unknown. From the careful studies already made, it is estimated that there are now standing and ready for trade under present market conditions, 200 billion board feet of merchantable timber. Since more than 98 per cent of the forest area is owned by the Insular government, this is all national forest, and as such has over one-half as much available timber as we have in all our national forests in America. In round numbers, the Philippine forests have at the present about the same number of cubic feet of timber available as the state of Minnesota now has, or about one-half what is still standing in the state of Washington. But the Philippine area produces largely woods of much higher value than that of our northern forests.

It is estimated that there are over 2,500 tree species represented in the Philippine forests. But most of these are little known, and rare, and will play no part in the lumber industry. Dr. Whitford gives a popular description of 106 trees, all that have any prominence in the lumber markets. Briefer mention is made of 272 other trees of common occurrence. The most important species are illustrated with full page plates showing the forest, or the particular tree as it stands, giving a good idea of the habit of bole and bark, and often with leaves or fruit included. Very fine full page pen drawings of twig, leaf or fruit also accompany the description of the more important species. Only one thing seems to be lacking here, and that is a three color print of the finished wood to show the beauty of pattern and color. But this want is provided by the Bureau in another, and perhaps even better way, by the preparation and sale of hand specimens of over 400 of the principal merchantable woods.*

Most of the tree species are found in all the islands, and the variety is everywhere great. Dr. Whitford records an extreme case of eighty different tree species found on a given acre, and of these only two species which reach a merchantable size when mature. These studies have brought out the surprising fact that 70 per cent of the total forest wealth of the Islands is found in the Dipterocarp family alone, the lauans, apitongs, and yacals. Moreover, these species are usually found in almost pure stands, recalling the pine areas of our Great Lakes region. They are among the largest trees in the forests, reaching a height of 200 feet, and a diameter of seven feet or over, and the conditions invite the use of steam and the most up to date logging methods. Then, too, they are construction timbers, and take their place in the market along side of the American pine, fir and oak.

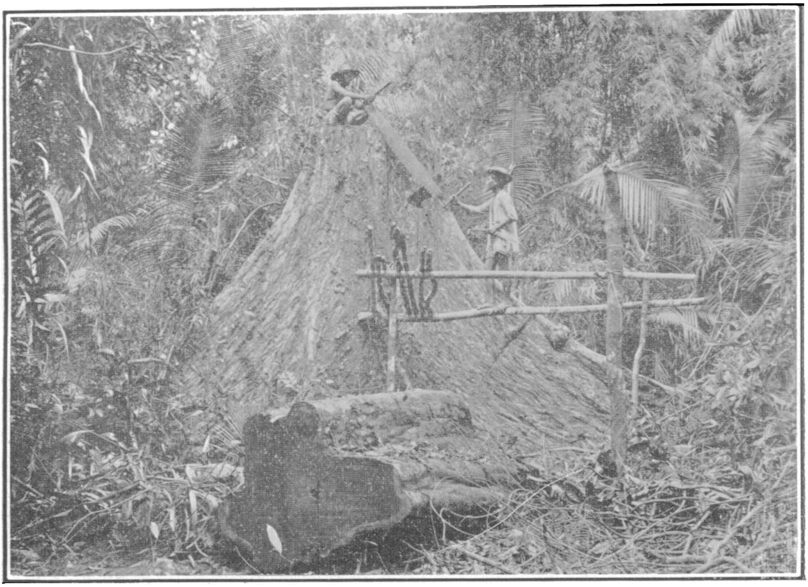

Fig. 5—Cutting out a single piece table top from a buttress of the narra tree.

---

* Each sample is about four by six inches and three-eighths inch thick, with planed surfaces to show the grain. These samples are sold at ten cents each, plus four cents postage, though twenty-one of the hardest and rarest of them are held at twenty cents each.

Next in importance to the dipterocarps, is the narra or locust family, furnishing many of the most beautiful of the cabinet woods. The dipterocarps are tolerant of shade, while the narras are light loving. As a consequence the dipterocarps occupy large areas of rich soils and well watered lands with relatively pure stands, while the narras occur isolated, in places of dry or sandy soil, or along streams. Six species of the narra family, narra, tindalo, banuyo, supa, acle, and ipil, are superb in color, grain and texture, and "for furniture and cabinet making will compare with any six other woods in the markets of the world."

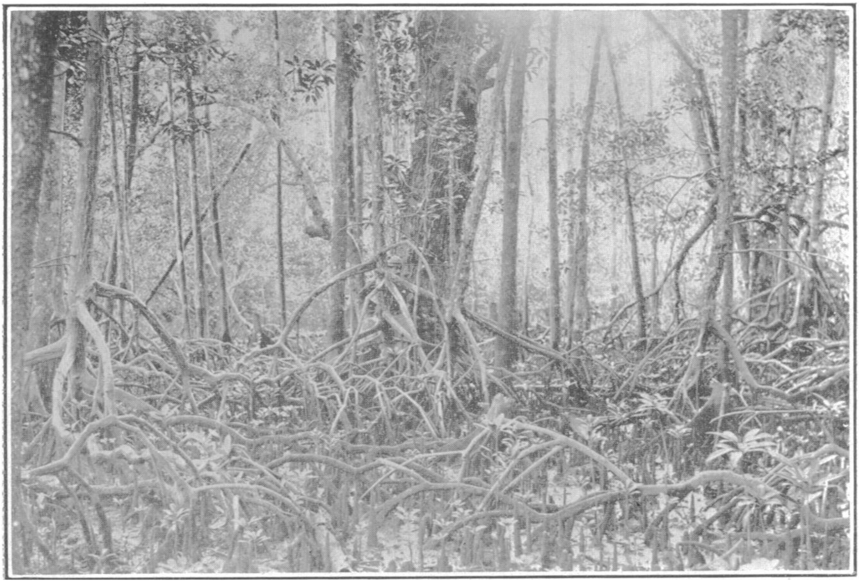

FIG. 6—Interior of a mangrove swamp, on Mindoro Island.

There are no woods anywhere more beautiful than the red and yellow narra, and the trees furnish merchantable logs up to fifty feet in length, and exceptional trees to seven feet in diameter, while the wide spreading buttresses furnish single piece table tops up to seven feet or over in diameter. The white and red lauan and the calantas work as easily as pine, yet are as beautiful in the finished work as mahogany.

The business of lumbering in the Philippines is not well developed. About 70,000,000 feet of native lumber was used in the islands last year, and 20,000,000 feet imported from America, mostly for the use of the army. Most of the licenses issued by the government are for small operators. Only three companies are using steam and American logging methods, yet there are large opportunities for development. "It is estimated that the forests properly managed can be made to yield two billion board feet annually, without being damaged. This will allow a rotation of one hundred years."

There are minor forest productions of great interest and large possibilities. There are fortunes to be made in the cutch industry, the mangrove swamps supplying the bark. These barks show from 12.5 to 39.3 per cent tannin. "It has been demonstrated beyond doubt that the soil and climate of the Philippines are favorable to the growth of the standard rubber trees." One plantation in the island of Basilan is already successfully producing rubber, and others are being started, with large promise in development. All the forests produce the rattans, though the best come from Palawan. There are large possibilities in the use of this material, for baling, matting, the furniture trade, and a great extension in plaited and woven work. The sap from the flower stalk of the nipa palms, and from the buri palm, already supply the alcohol and vinegar and fermented liquor (tuba) used in the islands, but as a source of commercial alcohol there are almost endless possibilities. The sap has as high a percentage of sugar as has the sugar beet of Prussia. Hundreds of square miles of nipa swamps lie unused and ready for continuous production.

Concessions cost nothing, and exclusive privileges may be obtained in tracts up to several hundred square miles in area. Stumpage is sold for less than half what is charged for similar forests in neighboring lands. Forest charges for the materials derived are low, averaging ten per cent of the local market price at place of production. Only the timber and minor forest products are sold, the land remains in the possession of the government.

We, as Americans may congratulate ourselves on the fact that we have achieved a good government in the Philippines, that the tremendous possibilities of wealth production in the islands are being so successfully studied, that the resources are being made available in such a way as to conserve the resources, and at the same time the rights of the Islanders. The forests as they are now may easily produce over three hundred million dollars of wealth each year indefinitely; and if, by reforestation and fire control, and other wise forestry plans which Major Ahern has adopted can be carried out, in two generations this enormous forest asset may be doubled.